in the wide tube is gradually expelled by the air, and the wet cloth secures that all of it will be driven out before any air gets in. The water contained in the narrower tube remains to indicate the depth by a suitable scale engraved on the glass, and then is let out by withdrawing the terminal plug.

For actual use the wide inlet tube is made of brass and the narrower tube of glass. Three sets of these tubes are combined into one instrument, and in each set there is a special ratio between the capacities of the inlet and retaining tubes, in order that the set in question may answer for certain depths. Flying soundings are usually taken in depths ranging up to 130 fathoms, and the three sets are designed to indicate depths, say, from 12 to 28 fathoms, from 28 to 60 fathoms, from 60 to 130 fathoms. They are fitted into a brass protecting cylinder, open at one end to the water, and slotted out in the sides to allow the engraved scales on the gauge tubes to be seen from the outside. The whole is then enclosed in a galvanized iron guard-case drilled with small holes to allow the seawater to enter, and being attached to the sinker is lowered into the sea. The apparatus is manufactured by Mr. Whight, of Glasgow, for Sir William Thomson, and it has already been adopted on H. M. S. *Valorous*, and the Russian imperial yacht *Livadia*.

While upon this subject we may also draw attention to the "nipper" lead of Mr. Lucas, engineer to the Telegraph Construction and Maintenance Company. The old plan of ascertaining the nature of the sea bottom, by bringing up a specimen of it in a tube, let into the bottom of the sinker and armed with tallow, is open to several objections. For instance, the specimen is apt to get washed out in rising to the surface, and when it is safely brought on board it is usually so smeared with tallow as to be objectionable. The nipper lead of Mr. Lucas, on the other hand, retains what it catches and renders it up in a pure state well fitted for preservation. The bottom of the lead or sinker in question is provided with two hollow claws or spoons, not unlike the mandibles of a crab. These are hinged to the sinker, and open out against the resistance of a stout spiral spring which is contained in the body of the sinker. When fully opened out they are kept apart by a locking device, consisting of two crossbars which meet end to end and fit into each other. The points of the open claws, however, in striking upon the bottom, spring this lock, and the claws snap together with great force, nipping up a specimen of the bottom at the same time, and from their hollow shape this specimen is retained. So effective is the nipper lead that the claws will nip a sheet of paper off a table, and they have been found to raise a specimen of the bottom from 2,000 fathoms.—*Engineering*.

BOTANICAL NOTES.

Every young naturalist needs to be on his guard against deception which is a frequent cause of serious mistakes.

Many strange species and unheard of peculiarities are sometimes discovered by the over zealous and credulous. Most imitations of natural objects are so bungling as to be readily detected, but occasionally something turns up which is such a surprise, that the fact is noted before its improbability is made evident.

The large springs of the limestone districts of Pennsylvania are exceedingly clear, cool and transparent. The principal plants living in them are species of Characeæ, and Veronica Americana, whose large, lettuce-like leaves have a very striking appearance when seen through the sparkling water. While visiting a spring one day in mid-summer, I was surprised to see some strange looking plants which appeared to be Marata cotula. Mentally noting this peculiar position for such a common and well-known weed of dry ground, I caught sight of something still stranger—a garden aster; another step and a zinnia and dahlia came to view. Indeed there was quite a garden "á immersion."

The small boys of the neighborhood had acquired the art of deftly binding flowering branches to small stones which held the plants to the bottom, while the strong upward flow of the water kept them neatly upright and life-like.

The search for plants upon vacant city lots, rubbish piles, and the like, always reveals a greater number and variety of species than one would suppose.

As several of these "local" floras have been published lately, I give one which interested me a good deal at the time of noting it. In Kingsford's Oswego Starch factory, large quantities of lime are used in the manufacture of corn-starch. The refuse lime is a pasty mass still having to a considerable degree the caustic properties of fresh lime. Large quantities of it accumulate about the factory, and are hauled off to get it out of the way. Several hundred loads were once deposited in the middle of a pasture, in a loose pile varying from three to six feet in thickness. Cattle tramped over it carrying more or less mud upon their hoofs, and their droppings collected to a considerable extent upon it. In time plants began to get a foothold there, and one mild day in winter, about three or four years afterward, I visited it, and was surprised to find the following well established: Cirsium, 2 sp., Rumex, Poa, Phlemn, Plantago, Graphalium, Verbena, Trifolium, 2 sp., Solidago, Marata, Chenopodium, Polygonum.

The white clover was especially luxuriant, and covered patches of several square feet with a perfect turf.

W. A. B.

A popular work on Algæ, by Rev. A. B. Hervey, to be illustrated with colored plates, is announced.

Professor Alphonso Wood, widely known as the author of a Class-book of Botany and other botanical text-books, died at his residence at West Farms, New York, on the 4th inst.

Trimen's *Journal of Botany*, despite its long standing and being without a rival in its chosen field, is obliged to make a call for a more liberal support in both subscriptions and contributions. This does not speak well for the enthusiasm of English systematists.

The second volume of *The Botany of California* has made its appearance. It includes the remainder of the Phanerogams not treated in Vol. I., the Pteridophytes, and the Mosses, and brings this eminent work to a successful close.

A new manual of the mosses of the United States will be published during the present year. The authors, Leo Lesquereux and Thomas P. James, are the most able and distinguished bryologists of America. The edition will not be large, and for the present the price is fixed by the publishers at $3.00. Such a manual has been needed for a long time.

In *The American Naturalist* for January, Professor Bessey calls attention to the Fly Fungi belonging to the genus *Entomophthora*. They have been but little studied. The most common species (*E. muscæ, Fres.*) infests the house fly. Dead flies are common in autumn covered with a white powder which fastens them to the walls and other objects of the room. Upon examination the bodies are found to be filled with the mycelium of the asexual stage of the fungus, the white powder being the conidial spores. This asexual form is described in many books under the name *Empusa*. The sexual stage develops entirely within the host, filling it with a mass of oöspores and hyphæ. The genus *Tarichium* is founded on this sexual condition of the plant. The two genera Empusa and Tarichium not being antonomous are re-

placed by the genus Entomophthora; but it is proposed by Giard, who has investigated the subject recently, to retain these names to designate the asexual and sexual stages respectively. These plants belong to the interesting order *Saprolegniaceæ*. Other species of the same order are abundant on dead and living fish, cray-fish, etc. They have sometimes proved very destructive to the young fish in hatcheries. The species of the order are not well known, although examples are easily obtained.

J. C. A.

MICROSCOPY.

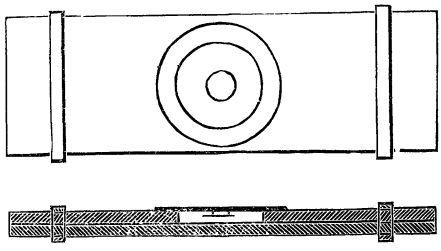
Mr. Julien Derby recently read before the Quekett Microscopical Club a paper describing various special "dodges," which may be employed by microscopists to facilitate their researches.

I. When allowing all but adepts in the use of microscope to peep through my high power glasses, I have often felt a certain degree of uneasiness, not to say of alarm, regarding the fate of valuable test-slides, or still more valuable objectives. Many others here present have no doubt experienced the same discomfort which I find an easy matter to attenuate to a considerable extent, by focussing from the eyepiece instead of from the coarse or the slow motion. All that is needed for this is a rack and pinion to the eyepiece of considerable length. An inch or two up or down corresponds here to a fraction of a turn of the fine adjustment of the microscope, so that very little danger exists of any sudden contact with the covering glass. As soon as an indistinct view of the object is obtained through the ordinary coarse adjustment of the microscope body, the focus is brought to exactness by means of the coarse motion of the eyepiece without much difficulty. For demonstrations or exhibitions in public, microscopes could thus be made without the ordinary fine motion.

II. When mapping with micro-spectroscope, the difficulty of measuring exactly the position of fine lines or absorption bands is often great, even when using the admirable micrometers invented by Mr. Browning and Mr. Sorby. I find that in most practical cases the micro-spectrum can be thrown upon a sheet of white paper by means of an ordinary camera lucida placed over the eyepiece of the spectroscope. Strong light by means of a condenser has to be thrown through the liquid under examination. By means of an ivory rule, finely divided, and brought back to a known line, say D, all other lines or bands may be directly measured off on the rule, and, if desired, the exact results in millionths of a millimetre may then be computed by any of the known interpolation formulæ, such as are given in Suffolk's useful little book.

III. The arrangement of small microscopic objects, such as diatomis, foraminiferæ, etc., on slides in regular lines, circles or patterns, can be much facilitated in the following way: "Draw with a pen and ink cross lines, or circles, or any other figure required on the surface of the plain mirror of the microscope; then focus down until the image of these lines is seen on the upper surface of the top lens of the condenser. By means of a mechanical finger, or of a steady hand with a rest, no difficulty will now be experienced in placing the objects in perfectly regular order.

IV. I now obtain excellent condensed monochromatic light by means of a bull's eye of unusual external shape, the internal portion of which, however, is filled with glycerine or oil of cloves colored to suit. This bull's eye has a plane back and a concavo-convex front, and the liquid is introduced through a hole in the flat side, closed by a small ground stopper. This apparatus is furnished with universal motions, and has a rack and pinion foot. It was made for me by Mr. J. Browning. When using blue light, produced by ammonia sulphate solutions, I have resolved, by means of this monochromatic bull's-eye amphipleura, with objectives in my possession, which will hardly show *Pl urosigma angulatum* under ordinary condenser illumination.



V. Some time ago, Mr. J. E. Ingpen, on my behalf, made a communication to the Club in regard to a growing regard to a growing slide I had devised for some special researches I was following at the time. Some difficulty seems to have been found in the making of these slides, so that it is with pleasure I now offer a still more simple contrivance for obtaining the same results. Here is the receipt: Take an ordinary glass slip with a circular hole, say, half an inch or more in diameter in the middle; lay this slip on an ordinary glass slide, not perforated. Then grease the top of the upper or perforated slide just a little way around the circular hole, and join the two slips of glass by means of two rubber rings (see Fig.). The object is then placed on a thin cover-glass, somewhat larger than the hole in the slide: it is covered by a thin glass cover, ¼ in. in diameter; the whole is then turned down and fastened to the slide by the adherence with the grease, while the small cover prevents the running of the liquid. The plant or animal under examination finds itself confined in a sort of minature Ward's case. When not under observation, the growing slide is laid flat in a shallow plate with water just above the line of junction of the two slips of glass, where, by capillarity, it creeps up to the central cell, where evaporation keeps the contained atmosphere in a state of constant and healthy saturation.

VI. *Copal Varnish.* I find this varnish dries very rapidly if slightly heated, or even if placed on a previously warmed slide. I have many hundred slides of diatoms prepared in copal varnish, and my friend, Mr. Van Heurck, of Antwerp, who was the first to use this material, has many thousands. The varnish to be used is what is called the "pale copal," and its consistency ought to be that of oil. It is much pleasanter to use than Canada balsam, does not make bubbles, and its refractive index is not very different from that of balsam, and does not interfere with the solution of diatom markings. I have of late made many preparations in copal, dispensing with the cover-glass altogether. The drop of copal is placed on the diatoms and heated lightly over the spirit-lamp. It soon takes the consistency of amber, and is hard enough to sustain wiping and brushing with a soft brush with impunity. The optical aberrations produced by the cover-glass are thus done away with.

ASTRONOMICAL MEMORANDA.

Professor C. A. Young has examined the 70 lines given on Angström's chart as common to two or more substances. Of these 70 lines, 56 were seen distinctly double, or triple; 7 single; and in regard to the remaining 7 there is still an uncertainty. The instrument used was a diffraction spectroscope with collimator and observing telescope, each of 3-inch aperture and about 42 inches focal length, and a Rutherford grating of 17,300 lines to the inch. The apparatus was strapped to a 12-foot equatorial provided with a driving clock, and powers magnifying from 50 to 200 diameters were used. A large prism with a refracting angle of 20° was placed between the object glass of the